8 CUMULATIVE IMPACTS

The CEQ regulations implementing the procedural provisions of NEPA define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). The regulations further explain that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time."

Cumulative impacts can be additive, less than additive, or more than additive (synergistic). This discussion of cumulative impacts describes the impacts from the NRI in the context of other activities within the project area that could also impact environmental resources. In identifying proposals and projects for consideration in estimating cumulative impacts, DOE considered only projects that would be executed within the next 10 years. Projects predicted to occur beyond 10 years were presumed to be too speculative to be considered reasonably foreseeable.

8.1 METHODOLOGY

The potential cumulative impacts were evaluated both for the period of project construction (anticipated to be 12 to 18 months) and for the post-construction (operation and maintenance) period of the project. The affected environment varies for each resource area, depending on the geographic extent of a potential effect. Unless noted otherwise, this would be the same as that used for the impact analyses in Chapter 4.

To address the contributions of the NRI to cumulative impacts, an understanding and knowledge of historical, existing, and reasonably foreseeable future activities are essential. It was assumed that current activities within the project area would continue into the future. These activities include forestry; agriculture; pulp and paper mills; urban, residential, and industrial growth; construction and operation of gas, electric, and communication transmission lines; and outdoor recreation. Suburban-style development is the most common type of development now occurring in Maine (Maine State Planning Office 2001). The NRI, as described under the proposed action and analyzed in this EIS, would be in addition to those activities. During construction of the NRI, AC mitigation would also be installed by Maritimes for its existing gas pipeline in areas where the transmission line would be located near, parallel, or cross the gas pipeline.

In addition to industrial and residential developments, a number of ongoing conservation efforts are being undertaken in the project area. The New England Forestry Foundation, in conjunction with the Downeast Lakes Land Trust, has secured an option to purchase a conservation easement on 312,000 acres (126,262 ha), currently being managed by Wagner Forest Management, that is bounded by the international border to the east and the West Grand Lake region to the west. The NRI would cross the easement lands in several townships. Nothing

in the easement's language would preclude the construction of the NRI (Eno 2004). Additional information, including maps, is available at http://www.neforestry.org/projecrts/dlfp.asp.

The reasonably foreseeable future actions within the project area that would affect the environment of the project area would include continued commercial logging and the proposed M&N pipeline expansion project, referred to as the Phase IV Project (TRC 2002). The M&N expansion project would include the installation of 31.3 mi (50.4 km) of a 36-in. (91-cm)-diameter gas pipeline loop in Washington County, Maine (the "Baileyville Loop"). The Baileyville Loop would be installed within the existing M&N gas pipeline ROW from the Baileyville Compressor Station to just before the crossing of Lake Brook, southeast of Fifth Machias Lake in Township T36 MD (TRC 2002). Originally proposed to be constructed in 2003, the project is now projected for 2008.

The following sections summarize the cumulative impacts identified for the resource areas within the locales of the proposed project route alternatives.

8.2 POTENTIAL CUMULATIVE IMPACTS

8.2.1 Alternative Routes

8.2.1.1 Air Quality

Pollutants from a number of sources, including vehicles, power plants and industrial facilities, agricultural and logging operations, mining, dust from unpaved roads, and open burning, have affected urban and regional air quality in the project region. Nonlocal sources of air pollution are transported long distances from population and industrial centers on the East Coast and in the Midwest and southern Canada. These areas generate suspended particulate matter, sulfur oxides, CO, hydrocarbons, heavy metals, and NO_x (LURC 1997). The most common and damaging pollutants from these sources include SO_2, suspended particulate matter (PM_{10} and $PM_{2.5}$), NO_2, ground-level O_3, and CO.

Construction, operation, and maintenance of the NRI would be unlikely to result in air pollutant concentrations that would exceed NAAQS. Multiple construction projects at the same time could contribute to regional pollutant emission loads from construction equipment and worker vehicle exhaust emissions. Localized and temporary incidences of fugitive dust emissions would occur along unpaved roads from vehicle use by NRI workers, logging and gas pipeline industry personnel, and the public. However, dust emissions would not contribute to cumulative impacts on regional air quality because they would be localized and temporary.

Air emissions from vehicles involved in operational and maintenance activities for the NRI would be minimal because of the small number of employees needed along the transmission line at any one time. The small number of employees and associated trips during project operation and maintenance would not have a noticeable effect on cumulative regional air quality.

A characteristic of snowmobiles is that they tend to emit high levels of CO and unburned gases (Stokowski and LaPointe 2000). In the long term, the operation of transmission lines generates very few air emissions; thus, the NRI would not contribute to a cumulative increase in air emissions. No cumulative impacts that would affect the attainment status in the project area under the NAAQS are expected.

8.2.1.2 Land Features

Impacts on soil resources could result from an increased area of disturbance for construction of multiple projects. These cumulative impacts would be similar to the potential impacts described in Section 4.2.2.1, but over a larger area of disturbance. These impacts include an increased potential for erosion and soil compaction from large equipment and from decreased vegetation cover resulting from ATV use and clearing for the ROWs and temporary access roads where necessary. The proposed project would contribute minimally to this impact because standard mitigation practices would be employed (e.g., the use of silt fence and restriction of construction equipment use on steep slopes [Sections 2.4.1 and 2.4.2]). Construction of the proposed project adjacent to the M&N gas pipeline or other ROWs would minimize the new area of soil disturbance because the ROW would not have to be as wide as for a new ROW (i.e., ≤ 155 ft [47 m] wide compared with 170 ft [52 m] wide).

Use of heavy machinery to construct the NRI could cause very localized soil compaction and diminish soil productivity. This would be similar to that caused by other construction projects, logging, and forestry (BPA 2000). However, because the NRI would be a linear project over a large geographic area, its contribution to cumulative impacts within any area would be minimal.

The construction of new temporary access roads, improvements to existing access roads, and installation of support structures could involve cut-and-fill operations. These could place increased demands on supplies of sand, gravel, and crushed rock. However, the amount of fill that could be required would not impact the supply of fill materials within the project area.

The increasing popularity of ATV and snowmobile use in the area of the NRI could increase soil compaction and create mud holes and gullies that alter hydrologic patterns and intensify erosion (Stokowski and LaPointe 2000). However, co-location of the NRI with existing cleared corridors would minimize the potential for new ATV access ways, and therefore minimize new ATV-related impact areas.

Cumulative impacts on geologic resources or seismic characteristics from the NRI are expected to be negligible. The proposed project would include several standard mitigation practices to mitigate impacts from blasting, excavation, or earthmoving activities (Section 2.4.2). Any impacts that might occur would be minimal and largely limited to the project site.

8.2.1.3 Land Use

There may be adverse cumulative effects on land use as a result of past, present, and reasonably foreseeable projects. Potential industrial and residential development would introduce land use changes. BHE's proposed project, combined with other transmission lines, gas pipelines, and industrial and residential growth, could result in the development of land that is currently either undisturbed or used for other activities such as timber production.

If multiple projects are under construction simultaneously, an increased amount of land would be used temporarily for construction lay-down and staging areas. For example, construction of the proposed NRI, installation of AC mitigation for the M&N gas pipeline, and other projects, such as residential construction, would temporarily require land use changes in the project area.

To the extent that changes in land use occur, areas that are currently used for recreation may no longer be available for recreation, or may provide a different recreational experience because of a more developed setting. Increased access from multiple projects, especially transmission lines and gas pipelines that require ongoing maintenance and access, could accelerate the increased recreational use within the project area. Such projects could cause a change in aspects of the recreational experience from more remote wilderness activities to more organized activities such as ATV and snowmobile use.

The new transmission line would contribute to the continuing decline of remote recreational opportunities available within the region, especially along waterways. ROWs increase access to ATV and snowmobile use, which can cause user conflicts with nonmotorized recreational uses. ATVs and snowmobiles may also result in environmental degradation that reduces the pleasure of nonmotorized visitors (Stokowski and LaPointe 2000). In addition, cumulative impacts on land use would consist of a very small reduction in the amount of land available for periodic timber harvesting.

Noise generated by construction activities and traffic would incrementally add to noise generated from logging traffic and operations along Stud Mill Road. However, increases in construction-related noise would be temporary and have no long-term cumulative impacts. Noise generated from corona activity would generally be near ambient sound levels. Corona-generated noise would occasionally be noticeable near the line. In conjunction with the visual intrusion of the line, noise from the transmission line could detract from remote recreational experiences.

Appropriate planning and evaluation to address impacts of all permitted activities of the NRI were required by the applicant at the State and local level to ensure that the proposed project would be compatible with ongoing activities and land uses in the project region. The contribution to cumulative impacts of the NRI would likely be small, since the project would cause no significant permanent loss of other current or future productive use of the region for other activities. However, the NRI would generally be compatible with many other land uses, including agriculture, recreation, and wildlife habitat conservation. The small number of workers required for construction of the NRI and installation of AC mitigation at any given time (e.g., about 120 during the peak construction period [150 for the MEPCO South Route] and only

several small crews during operation) would not likely add to cumulative impacts on land use or land disturbance that are occurring or have occurred from ongoing and past activities.

8.2.1.4 Hydrological Resources

Non-point-sources of pollution that threaten water quality within the project area include ATV use, poorly maintained logging roads, other roads, sand and salt facilities, peat harvesting, timber harvesting, faulty septic systems, phosphorus and other nutrients, pesticide drift and runoff, agricultural water withdrawal, beaver activity, acid precipitation, and landfill seepage and runoff (Arter 2003). In 1997, the Erosion and Sedimentation Control Law came into effect in Maine. It was designed to prevent further degradation of Maine's water bodies due to soil erosion by requiring sediment and erosion control measures for all construction projects. A new modification to the law (as of July 1, 2005) regulates all existing chronic erosion problems in watersheds most at risk. On July 1, 2010, the law will apply to all organized areas in the State of Maine, and landowners will be required to fix their chronic erosion problems (e.g., camp roads that wash out every spring, culverts that are washing out around their inlets and outlets, unstabilized ditches and embankments, and washouts downslope from any point of concentrated storm water runoff) (MDEP 2005).

The NRI's contribution to cumulative impacts on water resources is not expected to be significant. The proposed project includes a number of standard mitigation practices to mitigate impacts on both surface water and groundwater quality (TRC 2005a,b). Examples include the use of silt fence and controlling the release of regulated materials (Sections 2.4.1 and 2.4.2). Localized on-site mixing of concrete (if needed where steel-pole support structures would be used for angle or dead-end structures) during construction would require water. Operation and maintenance of the NRI would use very small amounts of water (e.g., to clean insulators) and would not result in discharges to surface waters. Operation of the NRI would not contribute to a cumulative long-term increase in water demand from potential residential and industrial growth.

8.2.1.5 Ecological Resources

The NRI would contribute to ongoing perturbations to ecological resources, such as habitat modification (e.g., reduction, modification, or fragmentation), increased noise, and human intrusion. ATV use, hunting intensity, and other activities that could impact ecological resources would likely increase because of the addition of the NRI ROW, especially in areas where a new, non-co-located ROW would be required.

Nearly all forests within the project area have been affected by past and ongoing human activity. Most of the alternative routes would pass through second- and third-growth mixed forests, which are under heavy harvesting pressure from paper company landowners. Clear-cutting, precommercial thinning, and selective herbicide application on regenerating growth are among the forestry practices followed to give softwoods a competitive advantage over hardwood species. Favoring the development of even-age softwood stands for the logging industry jeopardizes the diversity and natural resistance of forests to infestation (Ota and Restino 2001).

For example, widespread tree mortality has occurred throughout portions of Maine as a result of spruce budworm (*Choristoneura fumiferana*) infestations. The spruce-budworm epidemic of the 1970s and 1980s continues to affect the composition, structure, and distribution of Maine's forested ecosystems. Other invasive exotic pests (e.g., balsam woolly adelgid [*Adelges piceae*], hemlock woolly adelgid [*A. tsugae]*, emerald ash borer [*Agrilus planipennis*], and, possibly, *Phytophthora ramorum* [the causative agent in sudden oak death]) are also expected to pose threats in the future (McWilliams et al. 2005). Occasional severe ice storms can also impact biological resources. For example, an ice storm in 1998 affected more than 16.8 million acres (6.8 million ha) of forest lands in New England, New York, and adjacent Canadian lands (Faccio 2003).

The NRI ROW would be expected to be used by ATVs and snowmobiles that could impact vegetation. These effects can include injury or destruction of vegetation, increased erosion in areas of damaged vegetation or on disturbed soils, and changes in soil characteristics, such as moisture levels or compaction. These changes can alter plant community structure or even eliminate vegetation.

Land temporarily affected by the construction of the Baileyville Loop pipeline expansion project would total about 378 acres (153 ha), and about 85 acres (34 ha) of that would be affected permanently by operations. Typically, a cleared 75-ft (23-m)-wide ROW (the combined Phase II Mainline and Baileyville Loop ROW) would be maintained in upland areas and a 30-ft (9-m)-wide ROW would be maintained in wetlands and riparian zones (TRC 2002).

Areas disturbed by construction projects provide a potential point of entry for invasive species onto the landscape, which could lead to adverse modification of the surrounding ecosystems. The colonization and establishment of an invasive species within the project area would be a significant impact. The potential for the introduction and spread of invasive species would be greatest at clearing and construction locations and would continue during some project maintenance activities (i.e., ROW vegetation management).

The NRI would contribute to forest fragmentation that is ongoing as a result of timber harvesting and rural and urban developments. Additional forest fragmentation would increase recreational user access to deer wintering habitats in the project area. This increased disturbance could decrease use at these wintering habitats and therefore could reduce overwinter conditions of some deer. Because of the limited amount of deer wintering habitat that would be affected by the NRI, the cumulative effect is not likely to be significant. The NRI would contribute to habitats that increase browse available to moose and white-tailed deer. However, creation of additional ROW segments (e.g., where portions of the NRI would not be located within an existing corridor) would add to the areas that could be used by ATVs and snowmobiles. Snowmobile traffic has been shown to influence moose behavior within 1,000 ft (300 m) of a trail and displace moose into less favorable habitats (Colescott and Gillingham 1998). Noise from ATVs and snowmobiles may place undue stress on wildlife such as moose and white-tailed deer (Stokowski and LaPointe 2000). However, such impacts can be temporary (e.g., the animals may move back into the area once the disturbance has ceased). Snow compaction by snowmobiles can affect the survival and activities of small mammals (Stokowski and LaPointe 2000).

Vehicle use (e.g., transportation of construction equipment or components, monitoring, and commutes of workers) would potentially contribute to wildlife mortality from vehicle collisions. However, vehicle use of Stud Mill Road is limited, especially by members of the public, and it would not be expected to change because of the NRI; thus, the number of roadkills would be very low. Also, the NRI would be constructed during daylight hours, when roadkills of wildlife would be less likely to occur. From a wildlife population perspective, roadkills do not constitute a significant impact unless they involve a rare or endangered species.

Herbicide use for forestry applications, which generally incorporate broadcast spraying, could potentially affect wildlife by altering habitat; for example, it could affect the availability and use of browse by large ungulates such as moose (Santillo 1994). Herbicide treatment reduces, but does not eliminate, the use of clear-cuts by moose during the first 2 years after treatment. Also, the use of herbicides to promote conifer regeneration decreases deciduous browse availability, but greater conifer density and height may improve cover for bedding and foraging by moose in winter (Escholz et al. 1996). Broadcast applications of herbicides to clear-cuts in Maine reduced the abundance of both small mammals and birds as a result of reductions in invertebrate populations and reductions in the structural and floral complexity of vegetation (Santillo et al. 1989a,b); the applications also reduced the diversity of small mammal populations (Parker 1989).

Adverse effects on birds, which have the potential to act cumulatively with effects from other projects or activities, include reduced or altered habitat, direct mortality from bird strikes on conductors, and disturbance due to noise and human presence. Other activities in the area of the project have contributed to habitat fragmentation. For example, silvicultural activities have altered (and continue to alter) much of the forest habitat to that dominated by softwoods.

The number of birds killed from collisions with man-made structures in the United States is estimated at 100 million to well over 1 billion annually (Erickson et al. 2001). These estimates include up to 174 million birds killed by power line collisions. The effects of bird collisions on local populations would be a function of the number of individuals killed relative to the size of the total population of the species in the region. The number of birds that could be impacted from collision with the NRI conductors and shield wires would minimally increase losses from other causes of mortality within the ROI (e.g., hunting, predation, vehicle collisions, and collisions with existing transmission lines).

Noise during construction of the NRI would likely result in temporary impacts on wildlife. This would contribute to other noise sources in the area (e.g., forestry operations and vehicles). The cumulative impacts of noise on wildlife populations would be negligible for less sensitive species, or species with relatively large home ranges. Use of the NRI could increase ATV and snowmobile use in the project area. This could increase disturbance and temporary displacement of wildlife. The response of wildlife to disturbance depends on species, physiology and reproductive condition, distance, and intensity and duration of disturbance. These vehicles have the potential to disturb animals within the ROW and in locations where these vehicles leave the ROW to access other areas.

Threats to wetlands throughout Maine include loss and fragmentation from development, agriculture, and silviculture; pollution (sedimentation and toxic chemicals); water level changes; and invasive species (MDEP 2005). Incremental impacts on wetlands have led to severe reductions in their quantity in the United States. Construction of the proposed project would mainly contribute to the cumulative modification, rather than loss, of wetlands in the project area.

All ROW projects (e.g., transmission lines, gas pipelines, and roads) require stream crossings. However, the duration of effects on fish habitat would be short term and infrequent, and impacts on any given stream would be staggered over time. Also, the geographical extent of impacts would be localized. Impacts on streams are largely reversible. Standard mitigation practices would be implemented for any activity that involved a stream crossing; thus, cumulative impacts on fish and their habitats would be minimal. ATV use has been found to widen and rut forest roads and to increase the sediment load to streams, which may threaten fisheries. This potential impact is increased by ROWs that allow ATV access to resource areas that are otherwise less accessible (Stokowski and LaPointe 2000).

8.2.1.6 Cultural Resources

Disturbances from NRI development, combined with other surface-disturbing activities, could uncover or destroy cultural resources. However, the standard mitigation practices addressing cultural resources would limit potential impacts. In addition to project-related disturbance, the increased accessibility created by the ROW created for the project could cause cumulative impacts in the form of increased public visitation, recreational impacts, and vandalism. The cumulative impact on the area landscape from multiple projects would be greater than that from the BHE project alone and could evoke Tribal concerns about the value of the natural landscape within the project area.

8.2.1.7 Socioeconomics

Improved electricity reliability in the NEPOOL region would be expected to contribute to long-term socioeconomic benefits by supporting business development and regional growth. The cumulative result of BHE's proposed project, combined with industrial and residential growth, could generate more revenue and employment in the three counties during and following construction. However, any cumulative growth could also have the potential to stress community resources such as schools, police, and fire protection.

The NRI could potentially produce adverse cumulative impacts on commercial uses (e.g., forestry and agriculture) and recreation in the immediate area of the NRI. However, the relatively small amount of land required for the NRI, coupled with its mostly being located adjacent to existing ROWs, would result in only a minor impact on other commercial uses. Some commercial activities, particularly agriculture, could continue within most of the ROW. These would minimize conflicts with forestry, agriculture, and recreation.

Traffic impacts would be short term and limited to daylight hours. No long-term cumulative traffic impacts would occur. Multiple simultaneous construction projects could result in a temporary increase in traffic congestion and traffic accidents. No long-term cumulative traffic impacts would occur.

8.2.1.8 Environmental Justice Considerations

The proposed project would not result in any disproportionately high and adverse impacts on minority or low-income populations, as described in Section 4.8. Therefore, the proposed project would not contribute cumulatively to any environmental justice impacts.

8.2.1.9 Visual Resources

Visual resources would be impacted by the NRI. The introduction of construction equipment and staging and construction site areas resulting from multiple projects being under construction simultaneously would result in temporary increases in visual impacts on the project area.

The heights and type of support structures, together with their placement with respect to local topography, are factors that would contribute to visual intrusion on the landscape. The clearing of a new transmission line ROW and subsequent installation of the transmission line components would add to the continuing visual intrusion into the natural landscape from man-made features (e.g., existing electrical and gas transmission ROWs, and logging operations). The level of public acceptance of visual impacts could vary considerably, depending on the location and the activity in which the person was engaged. The presence of the NRI ROW would result in a cumulative impact on visual resources in remote areas.

8.2.1.10 Health and Safety

Noise generated by construction equipment would be variable and depend on the type, size, and condition of equipment used and the equipment operating schedule. Construction equipment could generate noise levels of about 80 to 90 dB(A) at a distance of about 50 ft (15 m). Local residents or recreationists near the project could experience intermittent noise from construction equipment and vehicles during the daytime. Most of the NRI would be located far enough away from people (e.g., homes) that noise levels would not increase above existing background levels. Cumulative noise impacts from simultaneous construction projects would be short term and limited to daylight hours. Noise generated by the Orrington Substation, the transmission line, and maintenance activities during the operational phase would approach typical background levels for rural areas at distances of 2,000 ft (600 m) or less and, therefore, would not be expected to result in cumulative impacts on local residents.

Increased risk to human health and safety could occur during construction and operation (particularly ROW maintenance) of the NRI on the basis of the inherent hazards associated with

construction activities and maintenance of ROWs and transmission line components. Cumulative impacts on human health and safety would be negligible considering the potentially low fatality and injury rates expected from construction and operation of the project (Section 4.10.2.1.8).

The proposed transmission line would add an additional source of exposure to EMF. EMF from the transmission line would decrease to levels comparable to those inside a home at distances of about 300 ft (90 m) from the edge of the ROW. However, few people live within several hundred feet of the proposed ROW. Therefore, measurable exposures from the line would mostly be infrequent and of short duration for transient traffic. In comparison with EMF exposures from the home and work environments, the contribution from the proposed transmission line would be minimal to negligible. This is especially true for those that use appliances such as computers and cellular phones for extended periods of time. For example, computer users are exposed to a magnetic field of 0.2 to 6.6 mG (average 1.4 mG) for a period of 1 to 606 minutes per day (average 176 minutes) (Mezei et al. 2001).

No Federal regulations have been established specifying environmental limits on the strengths of EMF from electric transmission lines. The cumulative impacts on human health and safety could be a minimal increase in background EMF exposure to those few residents in the immediate vicinity of adjacent transmission lines. Section 4.10 gives examples of EMF exposures of the existing MEPCO 345-kV transmission line and the NRI operating adjacent to one another. The EMF levels in this situation at a distance where residents would potentially be located are well below 0.8 mG, the average daily exposure to maximum magnetic fields from some common household appliances (NIEHS 2002a). While extensive research has been conducted to determine whether exposure to electric or magnetic fields may cause or promote adverse health effects, NIEHS concluded “The scientific evidence suggesting that EMF exposures pose any health risk is weak” and “The probability that EMF exposure is truly a health hazard is currently small” (NIEHS 2002a). On the basis of the above, no long-term cumulative human health impacts are expected to occur. However, the subject remains controversial.

There are several different categories of common environmental sources that can interfere with cardiac pacemakers. These sources include electrically coupled, magnetic, galvanic, ultrasonics and subsonics, and ionizing radiation (ARRL 2002). Most current research on this topic focuses on higher frequency sources such as cellular phones, citizen band radios, wireless computer links, microwave signals, radio and television transmitters, and paging transmitters (NIEHS 2002a).

Multiple simultaneous construction projects could result in a decrease in worker safety. The addition of the NRI would increase the number of ROWs where selective herbicide use occurs. However, portions of the NRI ROW would replace commercial timber lands that currently receive broadcast application of herbicides.

8.2.2 Rescission of the Presidential Permit

The Rescission of the Presidential Permit Alternative would not contribute to cumulative impacts within the project area.